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# Orthogonal Measures on State Spaces and Context Structure of Quantum Theory

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## Abstract

© 2016, Springer Science+Business Media New York.An interplay between recent topos theoretic approach and standard convex theoretic approach to quantum theory is discovered. Combining new results on isomorphisms of posets of all abelian subalgebras of von Neumann algebras with classical Tomita's theorem from state space Choquet theory, we show that order isomorphisms between the sets of orthogonal measures (resp. finitely supported orthogonal measures) on state spaces endowed with the Choquet order are given by Jordan ∗-isomorphims between corresponding operator algebras. It provides new complete Jordan invariants for σ-finite von Neumann algebras in terms of decompositions of states and shows that one can recover physical system from associated structure of convex decompositions (discrete or continuous) of a fixed state.

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## Keywords

Classical subsystem, Decomposition of states, Operator algebras